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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,400	02/06/2002	Shigetaka Kobayashi	JP920000346US1	9612

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09/24/2004

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EXAMINER

HARAN, JOHN T

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 09/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/068,400	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	John T. Haran	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the arguments filed on 9/2/04. The objection to claims 36-42 is withdrawn.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 25, 32, and 39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 25, 32, and 39 are not original claims and contain limitations not previously added in response to the first office action. Claims 25, 32, and 39 contain the limitation "the step of halting the irradiating step after said adhesive is heated to a predetermined, curing temperature, and after the halting step, cooling said assembly to **substantially room temperature** and applying pressure on said IC chip toward said substrate **during substantially the entirety of said cooling step**". This limitation of applying pressure during the entirety of the cooling step (until reaching room temperature) is new matter.

Applicant cites page 14, line 24 to page 15, line 16 for support of this limitation. The pertinent part of the passage reads: "When thermosetting ACF 24 is heated up to a

specified temperature, irradiation of near infrared rays 36 is terminated. **In the next step**, silicon chip 21 and array substrate 23 are **pressed** together by pressure indirectly applied to silicon chip 21 by pressurizing block 11 (**S 105**). As understood, substrate 23 is firmly supported by block 15. **Thereafter**, silicon chip 21, thermosetting ACF 24 and array substrate 23 are **cooled down** to room temperature (**S 106**)". There is no indication in the cited passage or anywhere else in the specification that pressure is applied **during the entirety** of the cooling step to room temperature. Such is not expressly stated. In fact the cited passage and Figure 2 appear to indicate that the pressure step and cooling step are distinct and independent steps. One of ordinary skill in the art reading the specification as a whole at the time the invention was filed would not have reasonably understood that applicant had possession of the claimed limitation of pressing during the entirety of the cooling step to room temperature.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

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Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 22-24, 28-31, 35-38, and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Oxman et al (U.S. Patent 6,395,124).

Oxman et al discloses a method for bonding a silicon IC chip to a printed circuit board made of FR4 (fiberglass reinforced epoxy resin) with a thermosetting adhesive wherein the printed circuit board is irradiated with near infrared energy and that energy passes through the printed circuit board to cure the adhesive (Column 9, lines 37-58 and Column 10, lines 33-34). Oxman et al does not explicitly state that the printed circuit board absorbs part of the near infrared energy and transmits the remainder to the adhesive, however it is inherent that the FR4 material does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the FR4 substrate. Oxman et al anticipates claim 22, 23, 29, 30, 36 and 37.

Regarding claims 24, 31, and 38, Oxman teaches using near infrared energy which is between 700 and 1200 nm (Column 5, lines 57-59).

Regarding claims 28, 35, and 42, Oxman teaches the IC chip is silicon and the printed circuit board is FR4 (Column 9, line 4 and Column 10, lines 33-34).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 25, 26, 32, 33, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oxman et al (U.S. Patent 6,395,124) in view of Uchiyama et al (U.S. Patent 5,847,796).

Oxman et al is relied upon for the teachings noted above.

Regarding claims 25, 32, and 39, Oxman et al is silent towards applying pressure to the chip after the adhesive has been heated to a curing temperature and the irradiation stopped until the assembly has cooled to room temperature. It is well known and conventional to press a chip against a circuit board during a cooling step after heating has been stopped, as shown for example in Uchiyama et al (Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cured to room temperature, but one skilled in the art would have readily appreciated that when the pressure is stopped is a function of a variety of factors, such as the material worked upon, the curing temperature of the adhesive, the thermal coefficients of expansion of the materials, etc. and would have appreciated maintaining pressure until the assembly reached room temperature to ensure adequate adhesion and to prevent warpage while cooling. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply pressure to the chip until the assembly has cooled to room temperature in order to ensure adequate adhesion and to prevent warpage during cooling in the method Oxman et al.

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Regarding claims 26, 33, and 40, Oxman et al is silent towards the adhesive being an ACF, however such is well known and conventional adhesive to using when bonding IC chips to a substrate, as shown for example in Uchiyama et al (Column 3, lines 4-7). It would have been obvious to use a conventional form of adhesive, such as an ACF, in the method of Oxman.

8. Claims 27, 34, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oxman et al (U.S. Patent 6,395,124) in view of Sedlmayr (U.S. Patent 6,034,818).

Oxman et al is relied upon for the teachings noted above.

Oxman teaches a list of exemplary lamp sources for the infrared energy including halogen lamps and xenon lamps but is silent towards using a quartz halogen lamp as the infrared energy source, however such are well known and conventional infrared energy sources, as shown for example in Selmayr (Column 39, lines 28-44). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a well known and conventional infrared energy source, such as a quartz halogen lamp, in the method of Oxman et al.

9. Claims 22-26, 28-33, 35-40, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al (U.S. Patent 5,847,796) in view of the admitted prior art and Oxman et al (U.S. Patent 6,395,124).

Uchiyama et al discloses a method of bonding an IC chip to the glass substrate of a liquid crystal device with a thermosetting anisotropic conductive film (ACF) or other thermosetting resin wherein the ACF is placed between the IC chip and the glass substrate and the ACF is cured to bond the IC chip and glass substrate together by irradiating near infrared energy (electromagnetic waves) through the glass substrate to the ACF to heat and cure the ACF (Column 13, line 61 to Column 14, line 26).

Uchiyama et al does not explicitly state that the glass substrate absorbs part of the near infrared energy and transmits the remainder to the ACF, however it is clear that glass does not have a 100% transmission rate of near infrared energy and that some part of the infrared energy will be absorbed by the glass.

Uchiyama et al is silent towards the substrate being fiberglass reinforced epoxy (FR4), however the admitted prior art teaches using a conventional glass substrate for the liquid crystal display, such as FR4, and that such conventional glass substrate is capable of use in the present application, i.e. the glass substrate absorbs part of the near infrared radiation and transmits part of it to the ACF (specification, page 8, lines 6-16). Furthermore it is known in the prior art to bond an IC chip to a FR4 substrate by curing adhesive with near infrared radiation that is directed at the substrate which absorbs some and allows some to pass through and cure the adhesive, as taught in Oxman et al (Column 9, lines 37-58 and Column 10, lines 33-34). One skilled in the art would have readily appreciated using well known and conventional materials in the LCD art for the substrate, such as FR4, that also partially transmit and partially absorb near infrared energy are usable in the invention in the process of Uchiyama et al. It would

have been obvious to one of ordinary skill in the art at the time the invention was made to using a well known and conventional glass substrate, such as FR4, for the liquid crystal device in the method of Uchiyama et al that is capable of absorbing part of the near infrared radiation and transmitting part of it to the ACF, as suggested in the admitted prior art and Oxman et al.

Regarding claims 24, 31, and 38, Oxman teaches using near infrared energy which is between 700 and 1200 nm (Column 5, lines 57-59) in order to cure the adhesive through the FR4 material and it would have been obvious to do such in the method of Uchiyama et al, as modified above.

Regarding claims 23, 28, 30, 35, 37 and 42, Oxman teaches using FR4 (Column 10, lines 33-34) and the admitted prior art teaches using FR4 as the conventional material. Uchiyama is silent towards the IC chip being silicon, however such is well known and conventional as shown for example in Oxman (Column 9, line 4). It would have been obvious to use conventional materials for the chip, such as silicon, in the method of Uchiyama et al, as modified above.

Regarding claims 25, 32, and 39, Uchiyama teaches pressing the chip against the substrate during a cooling step after heating has been stopped (Column 14, lines 20-27). It is noted that Uchiyama does not teach applying pressure until the assembly has cooled to room temperature, but one skilled in the art would have readily appreciated that when the pressure is stopped is a function of a variety of factors, such as the material worked upon, the curing temperature of the adhesive, the thermal coefficients of expansion of the materials, etc. and would have appreciated maintaining

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pressure until the assembly reached room temperature to ensure adequate adhesion and to prevent warpage while cooling. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply pressure to the chip until the assembly has cooled to room temperature in order to ensure adequate adhesion and to prevent warpage during cooling in the method of Uchiyama et al, as modified above.

Regarding claims 26, 33, and 40, Uchiyama et al teaches using an ACF (Column 3, lines 4-7).

10. Claims 27, 34, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al (U.S. Patent 5,847,796) in view of the admitted prior art and Oxman et al (U.S. Patent 6,395,124), as applied above in claims 22-26, 28-33, 35-40, and 42 and further in view of Sedlmayr (U.S. Patent 6,034,818).

Uchiyama teaches using a xenon lamp source or the like as the near infrared energy source, but is silent towards using a quartz halogen lamp (Column 13, lines 26-36).

It is well known and conventional to use quartz halogen lamps as a near infrared energy source and that such is an alternate expedient to a xenon lamp, as shown for example in Sedlmayr (Colum 39, lines 28-44). The two types of lamps are alternate expedient obvious over one another. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a well known and conventional infrared energy source, such as a quartz halogen lamp, in the method of Uchiyama et al.

Response to Arguments

11. Applicant's arguments filed 9/2/04 have been fully considered but they are not persuasive. Applicant's sole argument is with respect to claims 25, 32, and 39 and the limitation of pressing during the entirety of the cooling step to room temperature. As noted above, this limitation is considered new matter. In addition, Uchiyama teaches maintaining pressure during a cooling step, and while it does not maintain the pressure until the assembly is cooled to room temperature one skilled in the art would have readily appreciated that the duration of the pressure would depend upon a variety of factors, such as the material worked upon, the curing temperature of the adhesive, the thermal coefficients of expansion of the materials, etc. One skilled in the art would have had sufficient motivation to determine the necessary duration of the pressure in order to ensure adequate adhesion and to prevent warpage.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(571) 272-1217**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (571) 272-1156. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John T. Haran
Examiner
Art Unit 1733